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10/805,338	03/22/2004	Shin-ichi Nishizono	1075.1254	8996

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EXAMINER	
LEE, CHUN KUAN	
ART UNIT	**PAPER NUMBER**
2181	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/21/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/805,338	NISHIZONO ET AL.	
	Examiner	Art Unit	
	Chun-Kuan (Mike) Lee	2181	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 December 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *22 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

RESPONSE TO ARGUMENTS

1. Applicant's arguments filed 12/11/2006 have been fully considered but they are not persuasive. The rejection of claims 21-27 under 35 U.S.C. 112 second paragraph is withdrawn. Currently, claims 1-28 are pending for examination.

2. In responding to applicant's argument regarding independent claim 1 rejected under 35 U.S.C. 103(a) that the combined references of AAPA and Coates do not teach or suggest the claimed limitation "controlling means ... for controlling resumption of said I/O process in either a first system ... or a second system" and "switching means for ... " because AAPA teaches the utilization of one of the system at a time and Coates does not teach any technical idea that the reconnection system is switched in accordance with state of the queue, as stated on page 12, 4th paragraph and page 14, last paragraph. Applicant's arguments have fully been considered, but are not found to be persuasive.

Please note that one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

The examiner relied on the AAPA for the teaching that the DPR (Dynamic Path Reconnection) have two kinds of systems, wherein the two kinds of systems include the

one path mode and the scattering mode (i.e. the first system and the second system), wherein each respective system have the corresponding controlling mean; more specifically, the examiner relied on AAPA for the teaching of the storage control apparatus comprising the control mean for either the first system or the control mean for the second system (AAPA, Specification, p. 7, ll. 5-26); AAPA further teaches the buffer for queuing the requests, as there may have a number of I/O request waiting for reconnection in the storage controlling apparatus (AAPA, Specification, p. 9, ll. 7-9 and p. 9, ll. 14-16).

Coates teaches a method and an apparatus for data flow controlling comprising:

determining if the amount of data queued in a buffer is greater than a limitation (Fig. 5, ref. 200), and if it is determined to be greater, there would be an increase in the amount of data transferred from the buffer to a receiver (e.g. host) as the transferring rate of data is increased (Fig. 5, ref. 520); and

determining if the amount of data queued in the buffer is lesser than a limitation (Fig. 5, ref. 230), and if it is determined to be lesser, there would be a reduction in the amount of data transferred from the buffer to the receiver as the transferring rate of data is reduced (Fig. 5, ref. 540), wherein the data flow control enables the switching between operating at transferring the increased amount of data and operating at transferring the reduced amount of data.

By combining Coates' buffer flow control into AAPA's storage control apparatus' buffer for queuing the requests, the resulting combination of references would further teach the management module comprising:

determining if the amount of requests queued in the buffer is greater than the limitation, and if it is determined to be greater, more requests would be transferred (increasing the amount of requests from the buffer to the receiver), therefore operate the control mean for the scattering mode system as multiple requests are concurrently transferred;

determining if the amount of requests queued in the buffer is lesser than the limitation, and if it is determined to be lesser, less requests would be transferred (reducing the amount of requests from the buffer to the receiver), therefore would operate the control mean for the one path mode system as requests are transferred one at a time; and

switching between operating at the scattering mode system (e.g. transferring more requests) and operating at the one path mode system (e.g. transferring lesser requests) base on the fullness of the buffer, therefore, the control means would operate in either the first system or the second system.

In conclusion, the claimed "controlling means ... for controlling resumption of said I/O process in either a first system ... or a second system" and "switching mean for ..." would have been obvious by implementing Coates' flow control into AAPA's storage control apparatus' buffer for queuing the requests, as Coates' flow control enables the control mean for both the one path mode and the scattering mode to co-exist, by determining when to switch from one to another.

I. INFORMATION CONCERNING OATH/DECLARATION

Oath/Declaration

3. The applicant's oath/declaration has been reviewed by the examiner and is found to conform to the requirements prescribed in **37 C.F.R. 1.63.**

II. INFORMATION CONCERNING DRAWINGS

Drawings

4. The applicant's drawings submitted are acceptable for examination purposes.

III. REJECTIONS BASED ON PRIOR ART

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1-2, 9-11, 18-20 and 27-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior Art (AAPA) in view of Coates et al. (US Patent 6,694,389).

6. As per claims 1, 10, 19 and 28, AAPA teach a storage apparatus and a reconnection controlling method comprising:

a physical device (Drawings, Fig. 6, ref. 2a); and

a storage controlling apparatus (i.e. controller) (Drawings, Fig. 6, ref. 3) disposed between said physical device and a host (Drawings, Fig. 6, ref. 4) to control an access from said host to said physical device (Specification, page 1, l. 22 to page 2, l. 2);

said storage controlling apparatus comprising:

one or more host interface modules (Drawings, Fig. 6, ref. 20), connected to a plurality of channels (Drawings, Fig. 6, ref. 50) of said host through a plurality of paths belonging to the same path group, for controlling an interface with said host (Specification, page 2, ll. 17-19);

a management module (Drawings, Fig. 6, ref. 20) for generally managing the whole of said storage controlling apparatus (Specification, page 2, ll. 20-21);

said management module comprising:

a buffer for enqueuing information on one or more input/output requests to be reconnected among input/output requests from said channels of said host as control blocks (Specification, page 3, ll. 12-20; page 4, ll. 2-8; page 4, l. 25 to page 5, l. 6 and page 9, ll. 7-16), wherein the buffer stores the number of I/O requests waiting for reconnection, and managing said enqueued control blocks (Drawings, Fig. 7 and Specification, page 5, ll. 22-24) , wherein the management module controls the issuing of reconnection request (Fig. 7, ref. A13), therefore manages the enqueued control blocks associated with the I/O requests; and

a controlling mean, when an I/O process corresponding to one of said one or more control blocks managed in said reconnection queue is resumed, for controlling resumption of said I/O process in either

a first system of issuing a reconnection request to each of said paths belonging to the same path group one by one through said host interface module and requesting said host interface module to perform said I/O process using a path first successful in reconnection at the point of time that the reconnection succeeds (Specification, page 7, ll. 5-16), wherein the implementation of the first system would result in the lower transmission rate as the requesting is implemented one by one, or

a second system of issuing concurrently or almost concurrently the reconnection request to said plural paths belonging to the same path group through said one or more host interface modules and requesting said host interface module to perform said I/O process using a path which first succeeds in the reconnection (Specification, page 7, ll. 17-26), wherein the implementation of the second system would result in the higher transmission rate as the requesting may be implemented to more than one host interface module, and further more, there must be the controlling mean in order to properly operate in either the first system or the second system.

AAPA does not expressly teach the storage apparatus and the reconnection controlling method comprising wherein said management module comprising:

a reconnection queue;

the control means for the first system and the second system;

a monitoring means for monitoring the number of said enqueued control blocks in said reconnection queue; and

a switching means for dynamically switching the system to be executed by said controlling means to either said first system or said second system according to the number of the enqueued control blocks monitored by said monitoring means.

Coates teaches a method and a apparatus for data flow control comprsing:

determining the occupancy (e.g. fullness) of a buffer by counting the number of sub-buffers in a steady state of starvation and congestion (col. 11, ll. 21-32); and

determining if the fullness of the buffer is above an upper threshold (Fig. 5, ref. 500 and col. 3, ll. 36-50);

signaling the receiver regarding the increase of transmission rate if the fullness of the buffer is above said upper threshold (Fig. 5, ref. 520 and col. 3, ll. 36-50), therefore there would be an increase in the amount of data transferred from the buffer to the receiver;

determining if the fullness of the buffer is below an lower threshold (Fig. 5, ref. 530 and col. 3, ll. 36-50);

signaling the receiver regarding the reduction of transmission rate if the fullness of the buffer is below said lower threshold (Fig. 5, ref. 540 and col. 3, ll. 36-50),

therefore there would be a reduction in the amount of data transferred from the buffer to the receiver, wherein the data flow control enables the switching between operating at transferring the increased amount of data and operating at transferring the reduced amount of data.

It would have been obvious to one of ordinary skill in this art, at the time of invention was made to include Coates's buffer flow control into AAPA's management module's queuing of the requests. The resulting combination of the references teaches the storage apparatus and the reconnection controlling method further comprising:

implementing the buffer as the reconnection queue;

monitoring by determining the fullness of the buffer enqueuing the information on one or more input/output requests by counting the number of the euqueued control blocks;

determining if the number of control blocks in the reconnection queue is greater than the limitation, and if it is determined to be greater, more requests would be transferred (increasing the amount of requests from the buffer to the receiver), therefore would operate the control mean for the second system (i.e. scattering mode) as multiple requests are concurrently issued and transferred from the buffer to the receiver (e.g. host);

determining if the number of control blocks in the reconnection queue is lesser than the limitation, and if it is determined to be lesser, less request would be transferred (reducing the amount of requests from the buffer to the receiver), therefore operating

the control mean for the first system (i.e. one path mode) as requests are issued and transferred one at a time from the buffer to the receiver; and

switching between operating at the second system (e.g. transferring more requests) and operating at the first system (e.g. transferring lesser requests) base on the fullness of the reconnection queue, therefore, the control means would operate in either the first system or the second system.

Therefore, it would have been obvious to combine Coates with AAPA for the benefit of implementing a robust flow control ensuring the buffer does not become full (congested) or empty (starved) during transmission of data (Coates, col. 1, ll. 11-24).

7. As per claims 2, 11 and 20, AAPA and Coates teach all the limitations of claims 1, 10 and 19 as discussed above, where Coates further teaches the storage apparatus and the reconnection controlling method comprising:

wherein when said the number of the enqueued control blocks monitored by said monitoring means is not larger than a predetermined number (Fig. 5, ref. 530), said switching means switches the system to be executed by said controlling means to said first system (Fig. 5, ref. 540), and

when the number of the enqueued control blocks monitored by said monitoring means exceeds said predetermined number (Fig. 5, ref. 500), said switching means switches the system to be executed by said controlling means to said second system (Fig. 5, ref. 520).

8. As per claims 9, 18 and 27, AAPA and Coates teach all the limitations of claims 1, 10 and 19 as discussed above, where AAPA further teaches the storage apparatus and the reconnection controlling method comprising wherein when said second system is executed, said controlling means successively requests the second and later paths which succeed in the reconnection to perform the I/O processes corresponding to one ore more control blocks which can be reconnected among said control blocks managed in said reconnection queue (AAPA, Specification, page 7, l. 17 to page 9, l. 1).

9. Claims 3-8, 12-17 and 21-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior Art (AAPA) and Coates et al. (US Patent 6,694,389), and further in view of Mizuno (US Patent 6,922,743).

AAPA and Coates teach all the limitations of claims 1, 10 and 19 as discussed above.

AAPA and Coates does not teach the storage apparatus and the reconnection controlling method further comprising:

wherein said management module further comprises a management table for managing a use status of each of said paths through said one or more host interface modules; and

when either said first system or said second system is executed, said controlling means refers to said management table to issue the reconnection request to the corresponding paths set free in said management table through said host interface module.

Mizuno teaches a system and a method comprising:

a controller (Fig. 5, ref. 530) comprising a cross-call administration table (Fig. 5, ref. 540); and

wherein the cross-call administration table provides the status of a port (e.g. ready flag) that a I/O path is connected to (Fig. 8, ref. 825, 835), and further more, the cross-call administration table is read out to determine which of the channel control processors (Fig. 5, ref. 505) controlling the ports are not busy in order to carry out the reconnection process (col. 9, ll. 13-26).

It would have been obvious to one of ordinary skill in this art, at the time of invention was made to include Mizuno's cross-call administration table and the corresponding ready flag into AAPA and Coates's management module. The resulting combination of the references teaches the storage apparatus and the reconnection controlling method further comprising:

the management module comprises the cross-call administration table with the ready flag; and

when operating in either the first system or the second system, the control mean reads out the cross-call administration table in order to determine, through the host interface module (e.g. channel control processors), which of the I/O path is not busy to implement the reconnection process.

Therefore, it would have been obvious to combine Mizuno with AAPA and Coates for the benefit of increasing the data throughput to the host as the response to the host's request can be made rapidly (Mizuno, col. 4, ll. 39-43).

IV. CLOSING COMMENTS

Conclusion

a. STATUS OF CLAIMS IN THE APPLICATION

The following is a summary of the treatment and status of all claims in the application as recommended by **M.P.E.P. 707.07(i)**:

a(1) CLAIMS REJECTED IN THE APPLICATION

Per the instant office action, claims 1-28 have received a Final Action on the merits. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

b. DIRECTION OF FUTURE CORRESPONDENCES

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chun-Kuan (Mike) Lee whose telephone number is (571) 272-0671. The examiner can normally be reached on 8AM to 5PM.

IMPORTANT NOTE

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Donald Sparks can be reached on (571) 272-4201. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

February 13, 2007

Chun-Kuan (Mike) Lee
Examiner
Art Unit 2181

DONALD SPARKS
SUPERVISORY PATENT EXAMINER